FIG. 1

1: IMAGE PROCESSING DIVICE

5

4

3

6

INPUT I/F — 7

OUTPUT I/F — 8

2

I/O — 9

11a

CPU

ROM

RAM

HDD — 12

10   11   11b

FIG. 2

20: IMAGE PROCESSING DEVICE

22 — TIMING GENERATING CIRCUIT

21

23 — MEMORY CONTROL CIRCUIT

24 — INTERPOLATING COEFFICIENT GENERATING CIRCUIT

INTERPOLATING COEFFICIENT

25 — LINE MEMORY

26 — INTERPOLATING CALCULATING CIRCUIT

DIGITAL IMAGE INPUT SIGNAL (ORIGINAL IMAGE)

DIGITAL IMAGE OUTPUT SIGNAL (ENLARGED/REDUCED)
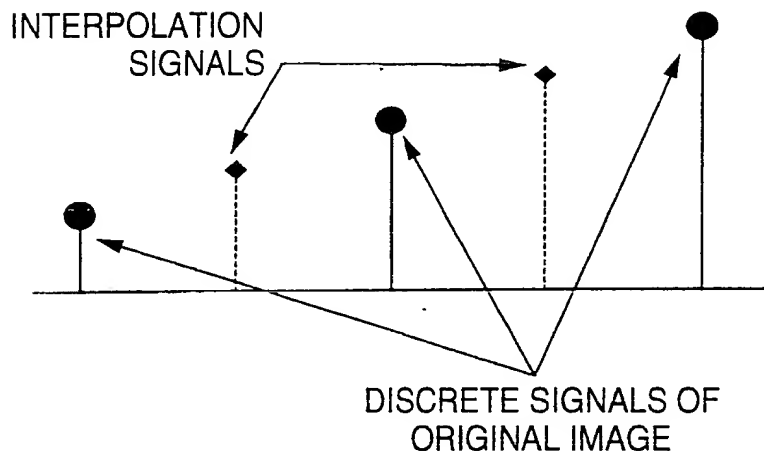
FIG. 3

FIG. 4

OUTPUT IMAGE WHEN ENLARGED (x 2 TIMES)

INTERPOLATION
SIGNALS

DISCRETE SIGNALS OF
ORIGINAL IMAGE

FIG. 5

OUTPUT IMAGE WHEN ENLARGED (x 3/4 TIMES)

INTERPOLATION
SIGNAL

DISCRETE SIGNAL OF
ORIGINAL IMAGE
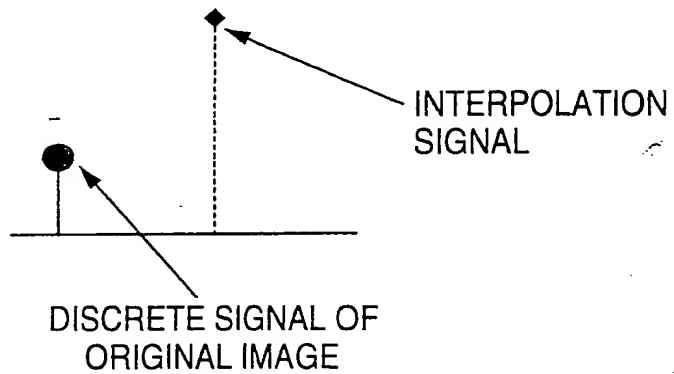
FIG. 6

INTERPOLATING FUNCTION BASED
ON BI-LINEAR METHOD

SAMPLING
POINT
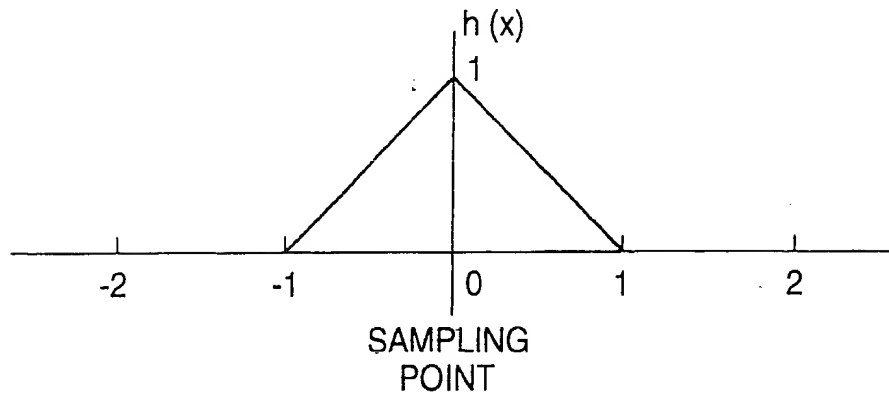
FIG. 7

INTERPOLATING FUNCTION BASED
ON CUBIC CONVOLUTION METHOD

SAMPLING
POINT
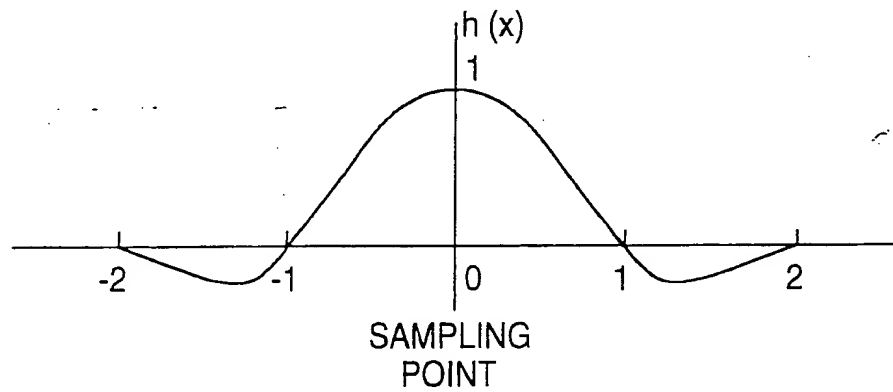
FIG. 8

INTERPOLATING FUNCTION (1)

SAMPLING
POINT

FIG. 9

INTERPOLATING FUNCTION (2)

SAMPLING
POINT

FIG. 10

INTERPOLATION
SIGNAL=A+B

Z^0

Z^{-1}

h_0Z^0

B

h_1Z^{-1}

A

CONVOLUTION IN BI-LINEAR
INTERPOLATING METHOD

FIG. 11

INPUT
SIGNAL

Z^{-1} h_1

OUTPUT
SIGNAL

D

Z^0 h_0
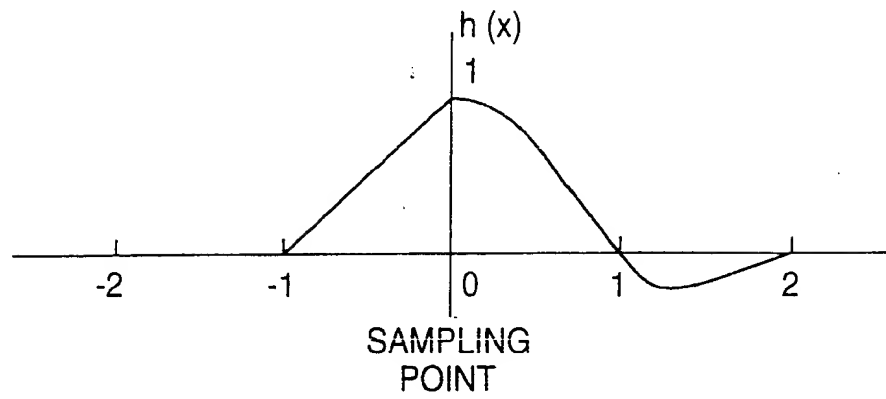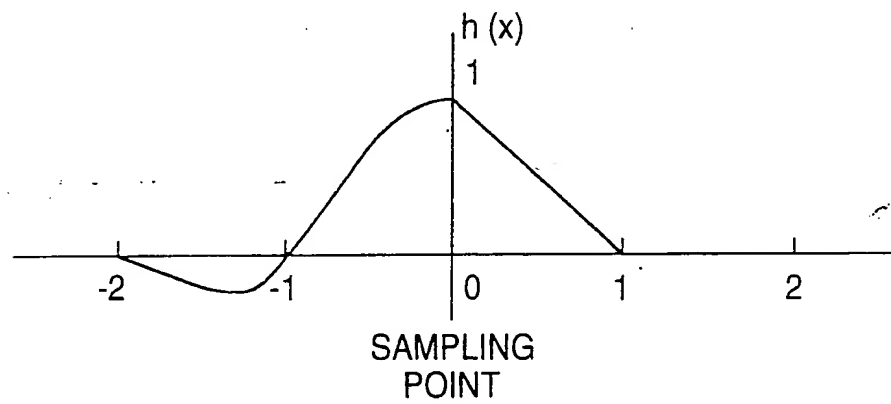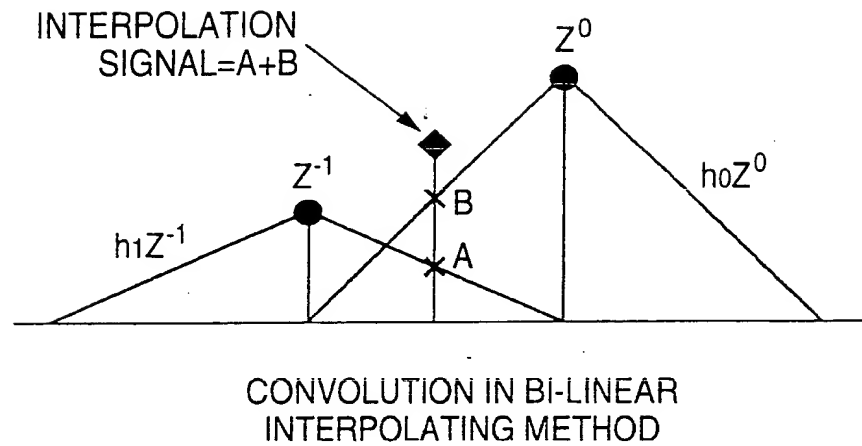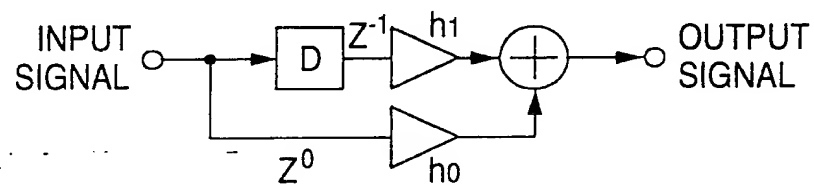
FIR FILTER OF BI-LINEAR POLATING METHOD

FIG. 12

INTERPOLATION SIGNAL A+B+C+D
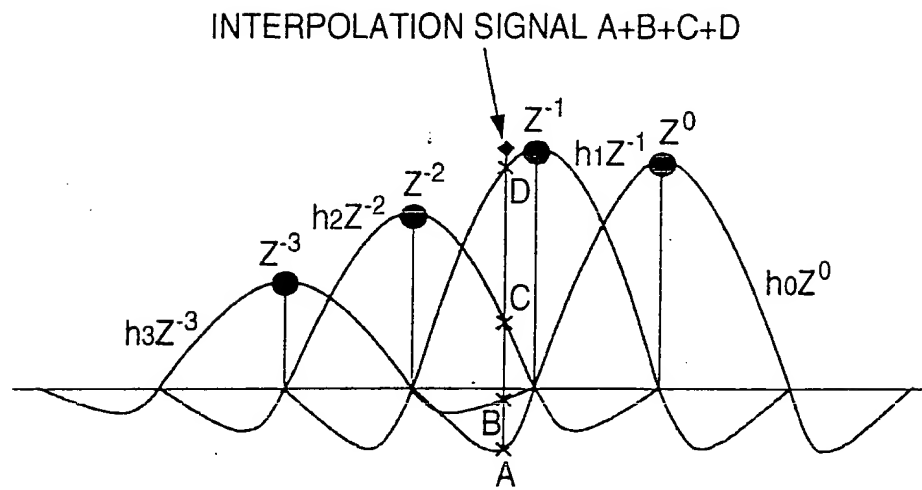
CONVOLUTION IN CUBIC CONVOLUTION
INTERPOLATING METHOD

FIG. 13
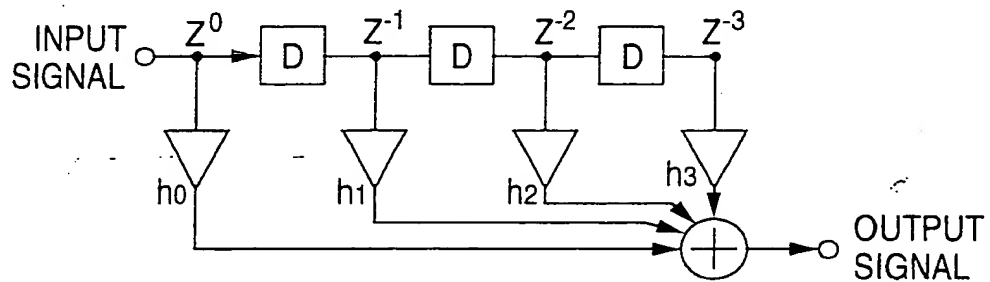
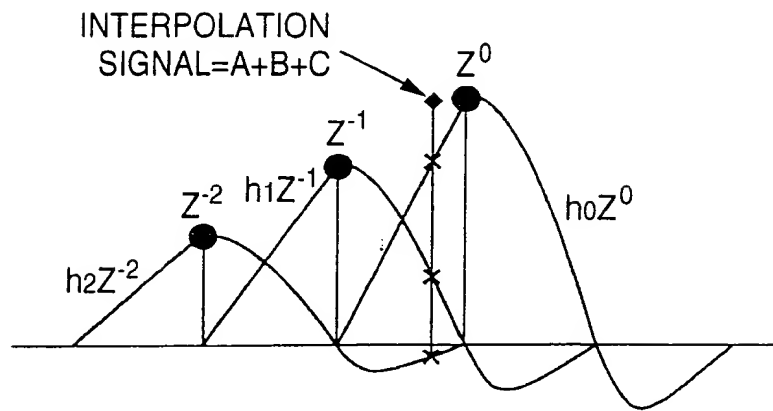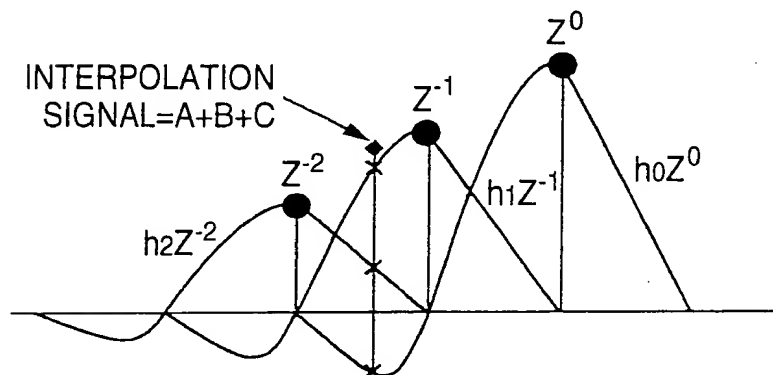FIR FILTER OF CUBIC CONVOLUTION
INTERPOLATING METHOD

FIG. 14

INTERPOLATION
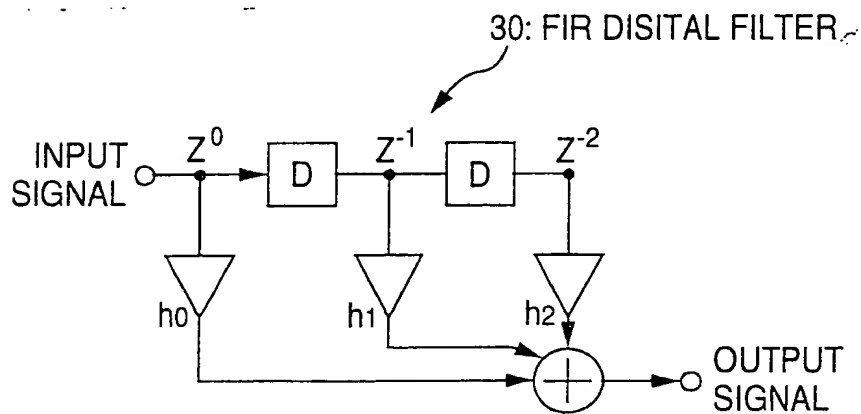SIGNAL=A+B+C

Z^0

Z^{-1}

Z^{-2}

h_1Z^{-1}

h_2Z^{-2}

h_0Z^0

FIG. 15

INTERPOLATION
SIGNAL=A+B+C

Z^0

Z^{-1}

Z^{-2}

h_2Z^{-2}

h_1Z^{-1}

h_0Z^0

FIG. 16

30: FIR DISITAL FILTER

INPUT
SIGNAL

Z^0

D

Z^{-1}

D

Z^{-2}

h_0

h_1

h_2

OUTPUT
SIGNAL

FIG. 17

-1 0 1 2

n

FIG. 18

IMPULSE
TRAIN

n

FIG. 19

n

RESPONSE OF INTERPOLATING FUNCTION
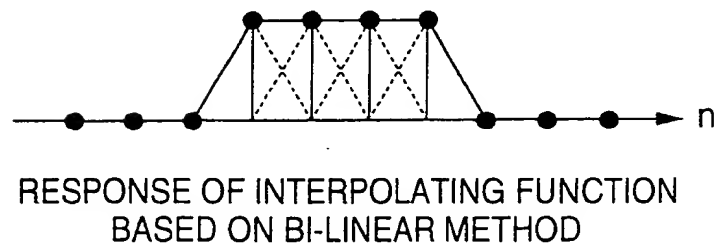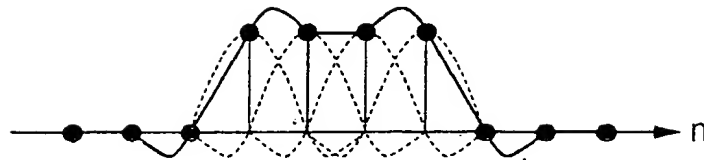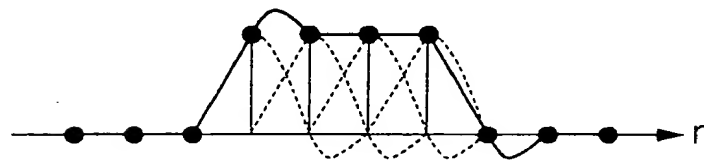BASED ON BI-LINEAR METHOD
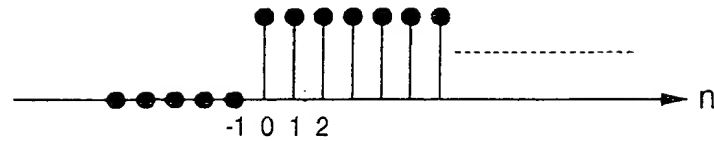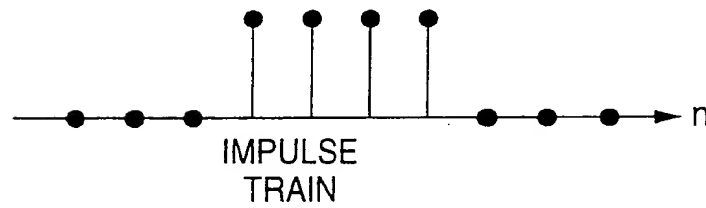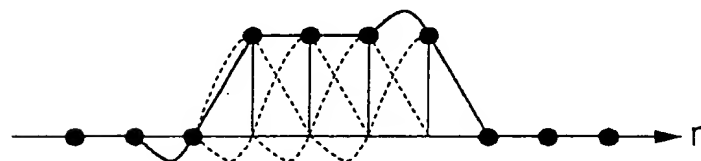
FIG. 20

RESPONSE OF INTERPOLATING FUNCTION
BASED ON CUBIC CONVOLUTION METHOD

FIG. 21

RESPONSE OF INTERPOLATING FUNCTION (1)

FIG. 22

RESPONSE OF INTERPOLATING FUNCTION (2)